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# INFECTION CONTROL AND CLINICAL MICROBIOLOGY

September 25-26, 2017 Chicago, USA

## Apple cider vinegar (ACV®) displays antimicrobial activity directly against *Escherichia coli*, *Staphylococcus aureus* and *Candida albicans* proteins and *in vitro* monocytes exposed to microbes by inhibiting inflammatory cytokine secretion

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**Introduction:** Extraintestinal pathogenic *Escherichia coli* (E-coli) are the most frequent cause of blood borne, urinary tract and hospital acquired infections. *Candida albicans* and *S. aureus* infections can also pose a huge threat especially following transplantation and to immunocompromised patients. Globally, there is a growing need for novel anti-microbial agents to target microbes and multi drug resistance from bacterial, fungal associated infections.

**Aim:** The aim of this study was to investigate the potential anti-microbial effects of ACV®. We used microbial strains: E-coli strain 6571, *C. albicans* strain 90828 and *S. aureus* purchased from ATCC. We tested the effect of commercial ACV® directly on microbial cultures over a 24-hour period, measuring inhibition zones. We also looked at whether ACV® could have an anti-inflammatory effect *in vitro*. This was tested using human blood derived monocytes which were incubated with microbes and ACV®. Collected supernatants were analyzed for pro-inflammatory cytokine secretion by ELISA.

**Results:** ACV® could significantly inhibit E-coli growth demonstrated by the results of direct co-culture with each of the microbial inoculum and ACV® in varying concentrations. The zone of inhibition with the addition of ACV® to each of the microbes varied dose dependently ACV® concentration. For *C. albicans* and *S. aureus*, concentrated ACV® had the strongest effect, whereas on E-coli cultures, the most potent effect was visible at lower dilutions including 1/50 dilution of the neat solution ( $p < 0.05$ ). When monocytes were cultured with both microbes they secreted inflammatory cytokines (TNF $\alpha$ , IL-6) ACV® was effective in significantly inhibiting inflammatory cytokine secretion in human peripheral blood monocytes cultured with E-coli, *S. aureus* and *C. albicans*. We also showed that ACV® can damage the microorganism protein moieties after 24-hours.

**Conclusion & significance:** ACV® displayed potent anti-microbial and anti-inflammatory activity against E-coli and *C. albicans*. We propose that ACV® could be potentially therapeutic.

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